Nuclear Operating Company

South Texas Project Electric Generating Station 4000 Avenue F – Suite A Bay City, Texas 77414

August 26, 2009
U7-C-STP-NRC-090120

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville MD 20852-2738

South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Response to Request for Additional Information

Attached are the complete response to NRC staff questions included in Request for Additional Information (RAI) letter numbers 162 and a partial response to RAI letter number 188 related to Combined License Application (COLA) Part 2, Tier 2, Chapter 19. The attachments contain the responses to the RAI questions listed below:

19-23	19-25	19-27
19-24	19-26	

When a change to the COLA is indicated, the change will be incorporated into the next routine revision of the COLA following NRC acceptance of the RAI response.

A summary of commitment COM 19.9-4 as modified in the Response to RAI question 19-27 is included as attachment 6.

If you have any questions regarding these RAI responses, please contact me at (361) 972-7136, or Bill Mookhoek at (361) 972-7274.

D091
NRO

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 8/26/09

Scott Head
Manager, Regulatory Affairs
South Texas Project Units 3 & 4

dws

Attachments:

1. Question 19-23
2. Question 19-24
3. Question 19-25
4. Question 19-26
5. Question 19-27
6. Summary of commitment COM 19.9-4

cc: w/o attachment except*
(paper copy)

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RAI 19-23

QUESTION:

The statements in Section 19N of the STP FSAR, Revision 2, do not appear to be consistent with the statements in Section 19N of the ABWR DCD ("Analysis of Common-Cause Failure of Multiplex Equipment") in accordance with departure STD DEP T1 3.4-1 (Safety-Related I&C Architecture). The inconsistencies are as follows:

1) Section 19N.5 of the ABWR DCD states "The effects of EMUX CCF are included in the quantification of core damage frequency in the internal events analysis of Appendix 19D. Additional discussion is given herein to provide further information and insight into the nature of EMUX CCF contribution to core damage frequency." In section 19N.5 of the STP FSAR, Revision 2, it appears that the term CCF is missing in this statement under departure STD DEP T1 3.4-1 (Safety-Related I&C Architecture).

2) Figure 19N-4 of the ABWR DCD states: "AUTOMATIC INITIATION THRU EMUX". Figure 19N-4 of the STP FSAR, Revision 2, does not appear to address this statement for departure STD DEP T1 3.4-1 (Safety-Related I&C Architecture).

3) Section 19N.3 of the ABWR DCD states: "(10) To reduce the probability of spurious initiation of ECCS, two SLUs are used in parallel within a division, with 2/2 voting at the final channel output to initiate equipment actuation." In section 19N.3 of the STP FSAR, Revision 2, the term SLU appears to be used incorrectly in this statement under departure STD DEP T1 3.4-1 (Safety-Related I&C Architecture).

4) Section 19N.3 of the ABWR DCD states: "(12) Control room indications, annunications, and alarms associated with EMUX transmitted control signals are dependent on correct operation of EMUXs." Section 19N.3 of the STP FSAR, Revision 2, does not include this statement under departure STD DEP T1 3.4-1 (Safety-Related I&C Architecture).

5) Section 19N.4.5 of the ABWR DCD states: "Only the analog-to-digital converters of the RMUs require calibration." In Section 19N.4.5 of the STP FSAR, Revision 2, the term ECFs appears to be used incorrectly in this statement under departure STD DEP T1 3.4-1 (Safety-Related I&C Architecture).

6) Section 19N.5.1 of the ABWR DCD states: "If there were sufficient experience data for multiple failures of solid-state multiplexing equipment, the experience data would be used directly and there would be no need for use of the beta-factor model. However, there is a dearth of multiple-failure data pertaining to solid-state multiplexer equipment, particularly equipment with a self-test feature. The alternative is to evaluate or estimate the relative susceptibility of the EMUX to multi-divisional failures through use of the beta-factor. A recent report by the Electric Power Research Institute (EPRI) (Reference 19N-1) discusses the beta-factor model and lists representative values for beta. The values listed generally range from 0.1 down to about 0.01, but there is no value given specifically for solid-state multiplexing equipment." Section 19N.5.1 of the STP FSAR,

Revision 2, does not appear to address this statement for departure STD DEP T1 3.4-1 (Safety-Related I&C Architecture).

7) Section 19N.5.1 of the ABWR DCD states: "The random unavailability of the RMUs and TLUs is derived from an expected mean time between failures (MTBF) and a mean time to detect and repair a failure (MTTR)." In section 19N.5.1 of the STP FSAR, Revision 2, the term TLU appears to be used incorrectly under departure STD DEP T1 3.4-1 (Safety-Related I&C Architecture) and Figure 7.9S-1 (Data Communication Interfaces).

8) In section 19N.3, Items (1), (3), (6), (8), and (9) of the STP FSAR, Revision 2, the terms DTU and TLU appear to be used incorrectly under departure STD DEP T1 3.4-1 (Safety-Related I&C Architecture) and Figure 7.9S-1 (Data Communication Interfaces).

The staff requests that the applicant address the above inconsistencies and revise Section 19N of the STP FSAR, as necessary.

RESPONSE:

Each of the items described above are addressed as follows:

1) The term CCF was inadvertently omitted from Section 19N.5 of the STP 3&4 FSAR. The FSAR will be corrected in a future revision of the COLA. The changes to Section 19N.5 of the FSAR are identified in the markup provided at the end of this response.

2) The STP 3&4 FSAR changes for Figure 19N-4 inadvertently included revised text from Figure 19N-3, and did not address other nomenclature changes associated with STD DEP T1 3.4-1. Specifically, DTU is changed to DTF and TLU is changed to TLF. The correct text and nomenclature, revised to reflect the departure, will be incorporated into a future revision of the COLA. The changes to Figure 19N-4 of the FSAR are identified in the markup provided at the end of this response.

3) The term SLU was inadvertently changed to DLC in Section 19N.3 of the STP 3&4 FSAR. This should have been changed to SLF per STD DEP T1 3.4-1. The FSAR will be corrected in a future revision of the COLA. The changes to Section 19N.3 of the FSAR are identified in the markup provided at the end of this response.

4) STP 3&4 FSAR Section 19N.3 will be revised to include the changes associated with STD DEP T1 3.4-1 for note (12), changing EMUX to ECF. Also, the current FSAR includes note (13) which is incorrectly labeled as note (12). The FSAR will be corrected in a future revision of the COLA. The changes to Section 19N.3 of the FSAR are identified in the markup provided at the end of this response.

5) STP 3&4 FSAR Section 19N.4.5 will be revised to correct the terminology, to clarify the operation of the self-test feature, and to correct the typographical errors associated with STD DEP T1 3.4-1. RMU is replaced with RDLC. The FSAR will be corrected in a

future revision of the COLA. The changes to Section 19N.4.5 of the FSAR are identified in the markup provided at the end of this response.

6) Other than editorial and nomenclature changes associated with STD DEP T1 3.4-1, there is no change to the common cause discussion in Section 19N.5.1. The discussion as presented in Section 19N.5.1 remains as stated.

   In accordance with 10CFR52.79(d)(1), the plant-specific PRA for STP Units 3 & 4 uses PRA information contained in the design certification PRA and has been updated to account for site-specific design information and any design changes or departures. As described in the Response to the Request for Additional Information 19.01-15, the changes associated with STD DEP T1 3.4-1 have been evaluated and the plant-specific PRA updated as required.

   No COLA revision is required as a result of this RAI response item.

7) FSAR Section 19N.5.1 will be revised to correct the terminology, changing TLU to TLF consistent with STD DEP T1 3.4-1. The FSAR will be corrected in a future revision of the COLA. The changes to Section 19N.5.1 of the FSAR are identified in the markup provided at the end of this response.

8) FSAR Section 19N.3, Items (1), (3), (6), (8), and (9) will be revised to correct the terminology, changing TLU to TLF and changing DTU to DTF consistent with STD DEP T1 3.4-1. The FSAR will be corrected in a future revision of the COLA. The changes to Section 19N.3 of the FSAR are identified in the markup provided at the end of this response.

The COLA changes indicated above are provided below. Changes to the COLA are indicated with gray highlighting.

19N.3 Basis for the Analysis

The information in this appendix section of the reference ABWR DCD and all subsections is incorporated by reference with the standard departure numbered STD DEP T1 3.4-1.

STD DEP T1 3.4-1

The design features of the ~~EMUX~~ ECF *that are of most importance to and form the basis for this analysis are the following:*

(1) *There is complete separation of ~~RMUs, DTMs~~* Remote DLCs, ~~Control Room DLCs,~~ *Digital* Trip ~~Units (DTU)~~Functions (DTFs), DLCs (performing the Safety Logic Function (SLF)), *Trip Logic ~~Units (TLU)~~*Functions (TLFs), *sensors and ECCS actuators, etc., between the four safety divisions of control and instrumentation.*

(3) *There is separation of ~~DTM~~~~DTU~~DTF and ~~TLU~~TLF modules within a division along the lines of "de-energize to operate" and "energize to operate" functions, i.e., RPS, and MSIV signals are processed by different ~~DTM~~~~DTU~~DTF and ~~TLU~~TLF modules than the ~~DTM and SLU~~ ~~DTU~~DTF* and DLC *modules used for ECCS control and PCV isolation (PCV isolation is also deenergize-to-operate). The RPS/MSIV process channel is "de-energize to operate", while the ESF process channel is predominantly "energize to operate".*

(6) *Comparison of a sensed input to a setpoint for generating a trip is done by a~~DTM~~ ~~DTU~~DTF. Coincident 2/4 trip logic processing for generating a divisional output trip is done by a ~~TLU~~TLF or* DLC performing the SLF.

(8) *Manual scram is implemented by hard wire to the scram pilot valve solenoids and does not depend on the correct operation of the ~~DTM~~* DTU *or ~~TLU~~TLF.*

(9) *A bypass of the RPS output logic unit is a manual, division out-of-service bypass, which allows repair of the ~~DTM~~* DTU *or ~~TLU~~TLF of that division without a half scram condition or half MSIV isolation condition. Only one division can be bypassed at a time.*

(10) *To reduce the probability of spurious initiation of ECCS, two ~~SLUs~~~~DLCs~~SLFs are used in parallel within a division, with 2/2 voting at of the final channel output to initiate ~~equipment actuation~~* the function. The final vote of the system initiation signals is accomplished with non-microprocessor based equipment in the logic or with a separate actuation of system valves and pumps, where both are required to initiate coolant injection. *~~If one ECCS SLU is in a failed condition, it is automatically bypassed, the control room is alerted, and the remaining SLU operates with 1/1 logic until the failed SLU is restored.~~*

(12) *Control room indicators, annunciators, and alarms associated with ~~EMUX~~ECF-transmitted control signals are dependent on correct operations of ~~EMUXs~~ECFs.*

(13) *Vital plant parameters are hard-wired to the remote shutdown panel independent of ~~EMUX~~*the ECF.

19N.4.5 ~~*RMU*~~ Remote DLC Miscalibration

STD DEP T1 3.4-1

Only the analog-to-digital converters of the ~~EMUX~~ ECFs *~~RMUs~~*RDLCs *require calibration. The calibration is automatic and computer-controlled. Calibration is accomplished by comparison to voltage, resistance and time references that are*

verified against external laboratory standards. The ~~EMUX~~ ECF transmission equipment is self-calibrating. The ~~technician only initiates calibration by pushing a button~~ equipment calibration is monitored continuously and automatically adjusted if needed to maintain calibration to on-board verified standards. In addition, the ~~self-test feature of~~ self-diagnostics in the equipment detects certain types of calibration faults.

19N.5 Discussion of the Effect on Core Damage Frequency

STD DEP T1 3.4-1

The three primary safety functions that are necessary to prevent core damage are reactivity control, core cooling, and decay heat removal. The effects of ~~EMUX~~ ECF CCF are included in the quantification of core damage frequency in the internal events analysis of Appendix 19D. Additional discussion is given herein to provide further information and insight into the nature of ~~EMUX~~ ECF CCF contribution to core damage frequency. The isolation function does not contribute directly to core damage frequency and is evaluated separately in Subsection 19N.6.

19N.5.1 General Plant Transient Events

STD DEP T1 3.4-1

The effect of common-cause ~~EMUX~~ ECF failure on CDF is included in the quantification of the event trees in Appendix 19D for transient-initiated and LOCA events. The random unavailability of the ~~RMUs~~ ~~remote~~ RDLCs and ~~TLUs~~TLFs is derived from an expected mean time between failures and a mean time to detect and repair a failure (MTTR).

Figure 19N-4 Event Tree for Failure to Isolate Due to ~~EMUX~~ECF CCF

STD DEP T1 3.4-1

There is no logic change to this Event Tree. The changes are limited to nomenclature as listed below:

- *AUTOMATIC INITIATION THRU ~~EMUX~~* ECF ~~TRANSMISSION~~
- CCF of ~~*EMUX*~~ ECF *
- * COMMON-CAUSE FAILURE OF ~~*REMOTE MULTIPLEXING UNITS,*~~ ESSENTIAL COMMUNICATIONS FUNCTION~~, *OR TRIP LOGIC UNITS*~~ (ECF, ~~remote DLC~~RDLC, ~~control room DLC,~~ ~~DTU~~DTF, DLC performing SLF, ~~TLU~~TLF)

RAI 19-24

QUESTION:

Per STD DEP T1 2.15-1, the Radwaste Building Substructure is reclassified from Seismic Category I to Non-Seismic. Please confirm that its failure from seismic and tornado loadings will not impact the adjacent seismic category I buildings and equipment. Describe the physical separation of this building from seismic category I structure.

RESPONSE:

The Radwaste Building will be designed such that under SSE or tornado loadings it does not collapse to cause an adverse interaction with the Category I buildings and equipment. The minimum separation distance to the adjacent Category I structures, and the height of the Radwaste Building above grade are:

Minimum Separation Distance to Reactor Building: 19 ft 9 inches
Minimum Separation Distance to Control Building: 33 ft 5 inches
Minimum Separation Distance to RSW Tunnel Shaft: 3 ft 4 inches
Height of the Radwaste Building above grade: 61 ft 1 inch

No revision to the COLA is required as a result of this response.

RAI 19-25

QUESTION:

ABWR DCD Section 19H.5.1 requires that the soil liquefaction evaluation and slope stability analysis be performed for 1.67 times the site-specific SSE. Please confirm, that this will be done or provide the basis for not performing the evaluation.

RESPONSE:

In the response to RAI 19-27 the scope of Commitment COM 19.9-4 was revised to include investigation of the potential for seismic induced soil failure at 1.67 times the site-specific SSE. Note that there is no safety-related slope at STP 3&4.

No revision to the COLA is required as a result of this response.

RAI 19-26

QUESTION

In Section 19K, Tables 19K-1, 19K-2, 19K-3 and 19K-4 from ABWR DCD are updated to reflect the STP plant-specific PRA results. These tables indicate that the plant-specific PRA results are provided in SSAR because the PRA section is not part of the DCD. However, it is not clear whether the applicant intended to state that the plant-specific results are identical to those in the SSAR, or the plant-specific changes are insignificant and, therefore, are not reported in the COL application. Please clarify this and make the appropriate changes to the text in Chapter 19. In addition, please review other sections in Chapter 19 to identify and clarify any similar occurrences.

RESPONSE

To eliminate the confusion with the notes on Tables 19K-1, 19K-2, and 19K-3 the notes will be revised as follows:

Table 19K-1 ABWR SSCs of Greatest Importance for CDF, Level 1 Analysis

* *Not part of DCD (~~Refer to SSAR~~ contained in plant-specific PRA documentation)*

Table 19K-2 ABWR SSCs With Moderate Risk Achievement Worth, Level 1 Analysis*

† *Not part of DCD (~~refer to SSAR~~ contained in plant-specific PRA documentation)*

Table 19K-3 ABWR Initiating Event Contribution to CDF, Level 1 Analysis

* *Not part of DCD (~~Refer to SSAR~~ contained in plant-specific PRA documentation)*

The majority of the data used for Table 19K-4 came from the ABWR Standard Safety Analysis Report (SSAR), so the note for Table 19K-4 remains as written, * Not part of DCD (refer to SSAR). Table 19K-4 will be modified as shown below to provide further clarification for the information provided in the Table.

Table 19K-4 Failure Modes and RAP Activities (Continued)

Component	Failure Mode/Cause	Recommended Maintenance	Test or Maintenance Interval	Basis	Unavailability, Failure Rate
~~*RBSW Cooling Tower*~~ UHS Fans	Failure to provide adequate fan flow through tower	Flow test Vibration Test	3 months	Experience	**
		Inspection and cleaning/lubrication	R/M Outage	Experience	**
Suppression Pool	Loss of structural integrity; leakage	Periodic inspection of suppression pool structural elements to detect degradation, incipient leakage or corrosion	R/M Outage	Experience	**
Suppression Pool Temperature sensors T53-TRS-601A and B	Sensor fails	Calibration of sensor	R/M outage	Experience	**
	Common mode failure	Analyze Level 2 calibration data for trends of drifting or other CCF indications	R/M outage	Judgment	**

** Contained in the plant-specific PRA documentation

‡ *These types of valves ~~and turbines~~ have been used in operating BWRs, so there is much experience to guide owners/operators in care of the equipment.*

Chapter 19 was reviewed for other instances where the ABWR SSAR was referenced. These other references to the SSAR are included below:

- 19.1S – Provides a cross-reference between the ABWR Design Control Document (DCD) information and the ABWR SSAR information, and the information guidelines of Regulatory Guide 1.206. No changes necessary to the citations.
- Table 19.2.2 – This Table correctly indicates that information for STD DEP 19.3-1, is only contained in the ABWR SSAR. No changes are necessary to this citation.
- Chapter 19.3 – This Chapter describes in more detail the STD DEP 19.3-1, and the reasons for this departure. No changes to these citations are necessary.
- 19C - Departures and changes reviewed against Appendix 19C of the SSAR, no conclusions in this section were affected. No change necessary to the citation.
- 19E.3 – Reference is made to the SSAR CRAC2 analysis. No change necessary to the citations.
- Table 19H-1 – Indicates that fragility information in the Table is included in the SSAR. The statement remains valid.
- Table 19R-6 – Indicates that the Internal Flood Core Damage Frequency Results are not part of the DCD and are included in the SSAR. This table will be clarified in a future revision to the FSAR to address site-specific Reactor Service Water Pump House internal flooding and to refer to plant specific documentation for the results as indicated below.

Table 19R-6 Internal Flooding Core Damage Frequency (CDF)

The information in this table is incorporated by reference with the following site-specific supplement: Low PCHS is not applicable to STP 3 & 4. The results for the site-specific RSW pump house internal flooding core damage frequency (CDF) applicable to the high PCHS of the SP 3&4 site is contained in plant-specific documentation that is not part of the FSAR.

	CDF (per reactor year)	
Building	**Low PCHS***	**High PCHS***
Turbine	Not Applicable	
Control	Not Applicable	
Reactor	Not Applicable	
RSW Pump House	Not Applicable	**
Total	Not Applicable	

* Not part of DCD (refer to SSAR).
** Not part of FSAR (contained in plant-specific PRA documentation).

RAI 19-27

QUESTION:

With respect to STP 3 and 4 COL application FSAR, Tier 2, Revision 2, Section 19.9.4, "Confirmation of Seismic Capacities Beyond the Plant Design Basis", the applicant's statement that seismic capacity analysis will be completed prior to fuel loading and the PRA will be updated in accordance with 10 CFR 50.71(h)(1) lack the necessary detail to comply with the COL License Information Item 19.9.4. COL License Information described in Subsection 19.9.4 of the ABWR DCD calls for implementation of actions specified in Subsection 19H.5.1 including the need for an evaluation of the site-specific plant level HCLPF capacity. Discuss in detail and elaborate as to how items listed in 19H.5.1, Seismic Capacity of the ABWR DCD will be implemented.

RESPONSE:

The confirmatory action stated in COLA Section 19.9.4 will be revised to include the following items:

1. Confirmation of the High-Confidence Low Probability of Failure (HCLPF) values for the important plant-specific/as-built components corresponding to the generic components defined in Subsection 19H.4.3.

2. Calculation of HCLPF values for site-specific SSCs (UHS/Pump House structure and Cooling Tower) whose failure may affect the plant response to seismic events and which are not included in the analyses described in Appendix 19H.

3. The investigation for the potential for seismic induced soil failure at 1.67 times the site-specific SSE.

4. Implementation of the remainder of the actions specified in Section 19H.5.

Items 1, 3, and 4 will be completed prior to the fuel load. Item 2 will be completed by September 2010.

COLA Section 19.9.4 will be revised as follows in a future update:

19.9.4 Confirmation of Seismic Capacities Beyond the Plant Design Basis

The following standard supplement addresses COL License Information Item 19.4.

~~The seismic capacity analysis will be completed prior to fuel loading and the PRA will be updated in accordance with 10 CFR 50.71(h)(1). (COM 19.9-4)~~

The following actions will be taken (COM 19.9-4):

1. The High-Confidence Low Probability of Failure (HCLPF) values for the important plant-specific/as-built components corresponding to the generic components defined in Subsection 19H.4.3 shall be determined. The values will be compared to the assumed HCLPF values given in Tables 19H-1 or 19I-1. This will be completed prior to fuel load.

2. HCLPF values for site-specific SSCs (UHS/Pump House structure and Cooling Tower) whose failure may affect the plant response to seismic events and which are not included in the analyses described in Appendix 19H will be established. This will be completed by September 2010.

3. The investigation for the potential for seismic induced soil failure at 1.67 times the site-specific SSE will be completed prior to fuel load.

4. The remainder of the actions specified in Appendix 19H.5 will be completed prior to fuel load.

COM 19.9-4

Commitment	Description	Completion Date
COM 19.9-4 Action 1	The High-Confidence Low Probability of Failure (HCLPF) values for the important plant-specific/as-built components corresponding to the generic components defined in Subsection 19H.4.3 shall be determined. The values will be compared to the assumed HCLPF values given in Tables 19H-1 or 19I-1.	Prior to fuel load
COM 19.9-4 Action 2	HCLPF values for site-specific SSCs (UHS/Pump House structure and Cooling Tower) whose failure may affect the plant response to seismic events and which are not included in the analyses described in Appendix 19H will be established.	September 2010
COM 19.9-4 Action 3	The investigation for the potential for seismic induced soil failure at 1.67 times the site-specific SSE.	Prior to fuel load
COM 19.9-4 Action 4	The remainder of the actions specified in Appendix 19H.5.	Prior to fuel load